

ABGLEICHSENDER AS 5/AS 5 F



GRUNDIG
electronic

ABGLEICHSENDER

AS 5/AS 5 F

Gebrauchsanleitung

Direction for use

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6.5 Einsatz als Frequenzmesser

Der digitale Frequenzmesser mit Quarzzeitbasis, der zunächst zur Messung der HF-Generatorfrequenz und der Markenfrequenz vorgesehen ist, kann auch als separater Frequenzmesser für externe Signale von 50 kHz...200 MHz eingesetzt werden. Die zu messende Frequenz ist dazu mit einem Pegel von min. 0,5 U_{eff} von min. 0,5 V max. 5 V an Buchse 11 zu legen. Der Gleichspannungspegel darf 50 V= nicht überschreiten. Für den Betrieb als Frequenzmesser sind folgende Einstellungen vorzunehmen:

Drehschalter 9 "Betriebsart" in Stellung "Frequenzmesser" bringen (rechter Anschlag)

Zug/Druckschalter 18 drücken (Frequenzmesser eingeschaltet)

Nun wird die Frequenz des an Buchse 11 liegenden Signales stufenrichtig mit Dimensionsangabe angezeigt.

Die Meßfolge ist mit Einsteller 18 im Bereich von 5...50 Messungen pro Sekunde einstellbar.

Erscheint in der linken Stelle des Anzeigefeldes 8 ein "F" (Fehler), so liegt die Frequenz außerhalb des Meßbereiches. Je nach aufleuchtender Lampe 6 ist dann Drehschalter 7 nach links oder rechts zu drehen, bis die richtige Anzeige erfolgt.

ACHTUNG! Wird die Mindesteingangsspannung U_{eff} von 500 mV unterschritten, so kann vor Aussetzen der Meßwertanzeige ein fehlerhafter Wert angezeigt werden.

6.6 Einsatz eines X/Y-Schreibers

In den Stellungen "FM-Generator" und "AM-Generator" des Drehschalters 9 liegt an Buchse 13 eine Gleichspannung. Diese Gleichspannung ermöglicht die Aufzeichnung von Frequenzabhängigkeiten auf einem X/Y-Schreiber. Die Generatorfrequenz wird dabei mit Einsteller 19 von Hand verändert.

1. Introduction

The AS 5 signal generator is a multi-purpose unit to carry out measurements on RF equipment. It is used in the laboratory, in the test line, for educational purposes and in the radio and TV service department.

Frequencies between 100 kHz and 120 MHz are generated in ten bands. Three of these bands may be wobulated (option I has five bands which may be wobulated).

Two ranges may be frequency modulated internally or externally (option I allows three ranges).

The integrated digital frequency counter replaces the conventional scale and permits a precise and rapid adjustment and read-off of the frequency required.

In addition, the quartz controlled counter may also be used to measure external frequencies up to 200 MHz.

The special form of generating a marker pip during wobulator operation replaces the conventional form of marker generator mixing. The marker pip frequency is measured exactly and is displayed in a digital fashion. The marker pip frequency is variable over the full wobulator range and is quartz stabilised.

The wobulator frequency and that of the X-deflection may be set between 5 Hz and 50 Hz and it is therefore also suitable for use with steep-cut filters. The shape of the signal is either triangular or of sawtooth shape and may be selected as required.

A DC potential, referred to the frequency, is available to record the frequency response by means of an X/Y recorder during generator operation.

2. Specification

2.1 General Applications

2.1.1 Climatic Conditions

Ambient temperature

Reference value:	23° C
Tolerance of reference value:	± 1 K
Nominal operating range:	I +5...+40° C
Limit range:	+5...+40° C
Limit range for storage and transportation:	-10...+60° C for 3 days at +60° C 3 cycles of dry climatic conditions for 6 hours from -10°...+60° C

Relative Humidity

Reference range:	45...75 %
Nominal operating range:	I 20...80 %
Limit operating range:	10...90 %

Air Pressure

Reference value:	101.3 kN/m ²
Nominal operating range:	I 70...106.0 kN/m ² (≤ 2200 m)

Heating Through Sunrays

Reference value:	No direct insulation
Nominal operating range:	I No direct insulation

Speed of Movement of Ambient Air:

Reference range: 0...0.2 m/s

Operating range: I 0...0.5 m/s

2.1.2 Mechanical Conditions

Operating Position

Reference value: The front and side panels of the unit must be vertical.

Tolerance of reference value: $\pm 1^\circ$

Nominal operating range: I reference position $\pm 30^\circ$

Ventilation

Reference value: Ventilation must not be obstructed.

Nominal range: I An insignificant amount of obstruction is permissible.

Drop Test

As per DIN 57 411, page 1

Vibration Test

As per DIN 57 411, page 1

2.1.3 Mains Supply

Mains Voltage

Reference value: 220 V

Tolerance of reference value: $\pm 1\%$

Nominal operating range: I $\pm 20\%$

Power consumption: ≤ 75 W

Mains Frequency

Reference value: 50 Hz
Tolerance of reference value: $\pm 1\%$
Nominal operating range: 45...65 Hz
Distortion of reference value: $I \beta = 0.05$
Protection class II as per DIN 57 411, page 1

2.1.4 Mechanical Information

Case

Standard case: G 51
Case colour: Sky blue
Dimensions: Width x Height x Depth
365 x 155 x 385 mm
Weight: ≤ 9 kg

Connecting Sockets

RF output: BNC
Frequency meter input: BNC
X-deflection: BNC
Audio in/output: BNC
Bias supply: Telephone jacks,
4 mm \varnothing , 19 mm spacing

2.2 Electrical Values

2.2.1 RF Generators

Frequency ranges, generator operation- AM:

Range	Frequency Range Limit	Range Overlap
1	0.1 MHz	$\geq - 3 \%$
2	0.21 MHz	$\geq \pm 3 \%$
3	0.41 MHz	$\geq \pm 3 \%$
4	1.0 MHz	$\geq + 0 \%$ $- 6 \%$
5	2.1 MHz	
6	4.6 MHz	
7	10 MHz	$\geq \pm 3 \%$
8	21 MHz	
9	46 MHz	
10	86 MHz	
	120 MHz	$\geq + 3 \%$

Frequency ranges, wobbulator operation

Range	Frequency Range	Deviation 100 % Δf
3'	0.395...0.535 MHz	140 kHz
7'	9.6 ...12.4 MHz	2.8 MHz
10'	83.0 ...125.0 MHz	42 MHz
Additional at AS 5 F		
6'	4.45 ...7.25 MHz	2.8 MHz
8'	30.5 ...44.5 MHz	14 MHz

Frequency ranges, generator operation-FM

Range	Frequency Range	Nominal deviation at
7'	9.6 ...12.4 MHz	10.7 MHz
10'	83.0...125.0 MHz	98 MHz
Additional at AS 5 F		
6'	4.45...7.25 MHz	5.5 MHz

Tolerance of frequency display: $1 \times 10^{-4} \pm 1$ digit

Frequency stability: After a 15-minute warming-up period, typically $\pm 1 \times 10^{-3}/10$ minutes.

After 2.5 hours warming-up period, typically $\pm 1 \times 10^{-4}/10$ minutes.

Temperature coefficient of frequency: Typically $\pm 5 \times 10^{-4}/K$

Deviation: In the wobbulator ranges
at 100 % = 95 % Δf
at 2 % = 2 % Δf

X-Deflection: Setting amplitude:
 $\pm 10 V \leq \pm 0.5 V$
 $\pm 1 V \leq \pm 1 V$

Input impedance $\leq 25 k\Omega$ for wobbulator operation.
Input impedance $\leq 50 k\Omega$ for generator operation.

Blanking: RF blanking on flyback during sawtooth deflection.

Wobbulator frequency: 5 Hz...50 Hz for sawtooth deflection, with marker pip insertion + 10 ms test duration

Shape of deflection voltage: Sawtooth/triangle

Amplitude modulation: In the ranges 1...10 and wobbulator ranges 3/7/10;

Internal:

1 kHz 30/80 %
4 kHz 60 %

External:

100 Hz...10 kHz
0...90 %

For this purpose the RF output voltage is reduced by 6 dB
($m = 0\%$, $V_{RF} = 50\% V_{RF}$ AM modulation off)

Deviation in modulation depth:

$\leq \pm 3$ dB, typically $\leq \pm 1$ dB

Frequency modulation: FM generator operation at frequencies: 10.7 and 98 MHz Additional at AS 5 F 5.5 MHz

Internal:

1 kHz, ± 15 kHz ± 40 kHz deviation
4 kHz, ± 30 kHz deviation
1 kHz + 19 kHz; ± 15 kHz ± 6 kHz deviation
1 kHz + 19 kHz; ± 40 kHz ± 6 kHz deviation

External:

30 Hz...20 kHz; 0...80 kHz deviation

Tolerance of deviation at nominal frequency:

Typically $\leq \pm 10\%$

RF output impedance:	75Ω approx., unbalanced
RF voltage: (open circuit potential/-level)	Referred to 75Ω termination and 75Ω source impedance
	<u>EMF max.</u>
	$\leq 570 \text{ mV}$, $\geq 380 \text{ mV}$ $\leq 115 \text{ dB } (\mu\text{V})$, $\geq 111 \text{ dB } (\mu\text{V})$ (level across 75Ω - 6 dB = $\frac{\text{EMF}}{2}$)
	<u>EMF min.</u>
	$\leq 5 \mu\text{V}$ $\leq 14 \text{ dB } (\mu\text{V})$ 80 dB (μV) marker ± 3 dB at 98 MHz
	With the SU 753 A, AE 10 and AM 10 accessories, the aerial input signal may be additionally attenuated to suit sensitive receivers.
RF output voltage tolerance:	$\leq \pm 1 \text{ dB}$ per frequency range $\leq \pm 1 \text{ dB}$ at maximum wobbulator deviation with 10% Δf spacing from the wobbulator range limits
RF output divider:	Continuously variable 0... $\geq 95 \text{ dB}$ Switchable 0/3/6 dB
Ratio of harmonics of the unmodulated RF signal:	Referred to 75Ω termination $\geq 20 \text{ dB}$, typically 28 dB

2.2.2 Audio Oscillator

Frequency:	1 kHz/ 4 kHz
Frequency tolerance:	$\pm 25 \%$
Open circuit output voltage:	$V_{rms} = 3 \text{ V}$
Tolerance of output voltage:	$\pm 0.35 \text{ V}$
Output impedance:	$10 \text{ k}\Omega$
Tolerance of output impedance:	$\pm 2 \text{ k}\Omega$
Distortion factor:	$D_{tot} \leq 0.25 \%$ Typically $\leq 0.03 \%$ at 1 kHz

2.2.3 Frequency Meter

Frequency range:	50 kHz...199.99 MHz
Display:	4 1/2 positions
Display tolerance:	$1 \times 10^{-4} \pm 1 \text{ digit}$
Range indication:	"F" for 19999 and between 10...20 MHz
Time base:	Quartz stabilised
Frequency tolerance:	$\leq 1 \times 10^{-4}$
Temperature tolerance:	$\leq 1 \times 10^{-4}/ 1 \text{ K}$
Gate time:	10 ms
Sampling rate:	Adjustable 5...50 Hz, using wobbulator frequency selector + 10 ms gate time
Input voltage:	$V_{in \text{ rms}} \geq 0.5 \text{ V}, \leq 5 \text{ V}$
Input impedance:	75 Ω approx., non-balanced

2.2.4 Marker Generator

Type of marker:

Illuminated pip

Principle of
marker Generation:

Stopping of X-deflection
and measuring of frequency

2.2.5 Bias Potential

Voltage range:

0... \geq 15 V

Current:

\leq 5 mA

Short circuit protected

Source impedance:

\leq 200 Ω

3. Accessories (as required)

G.UJ 75-11 Wide-band Balun Type SU 753 A

To match the unbalanced 75Ω RF output of the AS 5 to the balanced 300Ω aerial input of FM radio receivers. Simultaneously, the AS 5 output signal is attenuated by approximately 20 dB.

Length of cable 1.8 m approx.

G.UJ 63-22 Artificial Aerial AM 10

To simulate the data of an aerial for AM receivers as per DIN 45 305, page 1. This is required for the exact input circuit alignment. Contains an additional attenuation of 20 dB.

Length of cable 1.8 m approx.

G.UJ 63-21 Artificial Aerial AE 10

To simulate the data of a car aerial as per DIN 45 305, page 1 for 100 kHz...30 MHz and DIN 45 310, page 2 for VHF operation. Contains additional attenuation of 20 dB for VHF and 34 dB for LW, MW, SW. Switchable AM bands/VHF.
Length of cable 1.8 m approx.

G.UJ 75-01 Grip Terminal ZK 75

To supply the RF output signal to the object under test, e.g. to feed the wobbled signal to an IF amplifier, IF discriminator or tuner. Contains coupling capacitor of 4700 pF and termination resistor of 75Ω .

Length of cable 1.8 m approx.

G.US 43-10 Grip Terminal ZK 5

To connect to the low frequency voltage points at objects under test, e.g. to display pass band and discriminator curves. Contains decoupling resistor of $30 \text{ k}\Omega$.

Length of cable 1.8 m approx.

G.US 11-10 Demodulator Test Prod DK 3

Rectifier test prod with switchable bandwidth and limit frequency. To demodulate RF signals. Specifically intended to display pass bands in the frequency range from 150 kHz...1000 MHz. Length of cable 1.0 m approx.

G.UJ 66-22 Connecting Cable L 76

Coaxial cable, having a 75Ω impedance and fitted at both ends with BNC plugs. To connect the AS 5 to other units, fitted with BNC sockets. Length of cable 1.0 m approx.

H.UJ 71-03 Connecting Cable L 42

This is a twin-conductor flexible test lead with different coloured unbreakable banana plugs (containing socket for multi-connections). To connect the non-earthed control voltage to the object under test.

G.UB 30-02 Front Cover FH 1

This is a robust plastic cover for the AS 5 controls. It also serves as a transport container for connecting leads and test prods.

Additional accessories and exact specifications are contained in the "Test Gear - Accessories" brochure of GRUNDIG ELECTRONICS.

4. Operating Controls

Mains switch; rocker switch construction.
Top depressed = on, bottom depressed = off

Pre-set for non-earthed control voltages.

This voltage is required when wobbulating controlled amplifiers as an external control potential.

Output socket for non-earthed control voltage (4 mm telephone jack), protected against short circuits.

Selector switch for the different methods of modulation.

Coarse and fine controls to select marker frequency.

Pilot bulb to indicate incorrect frequency range selection (7) when using the AS 5 as frequency meter.

Left-hand bulb lights up: rotate switch (7) anti-clockwise.

Right-hand bulb lights up: rotate switch (7) clockwise.

Pre-set to select frequency range for wobbulator, generator and frequency meter.

Digital frequency display with floating comma and range indication. Depending on the setting of switch (9), the appropriate marker frequency, generator frequency or, for frequency measurements, the input frequency are displayed.

Please fold out the last illustration at the end of this brochure.

(1)

(2)

(3)

(4)

(5)

(6)

(7)

(8)

Selector for the different operating methods
Wobbulator (AM modulated)
Generator (FM modulated)
Generator (AM modulated)
Frequency meter

(9)

Pre-set for wobbulator deviation, allows setting from 2...100 % Δf of wobbulator frequency.

(10)

Input socket for the frequency under test during frequency meter operation.
Test range 50 kHz...199.99 MHz.

(11)

NOTE! Maximum input potential $V_{rms} = 5 V$

Pre-set for X-deflection voltage, adjustable between $\pm 1 \dots \pm 10 V$; simultaneously push-pull switch to select the signal shape of the wobbulator potential and of the X-deflection voltage.

(12)

Depressed: Sawtooth voltage
Pulled: Triangular voltage shape

(13)

Output socket for X-deflection voltage.

Audio socket

Audio output if switch (4) is set to modulated operation. (Open circuit output voltage $V_{rms} = 3V$)
Audio input for the external modulation of the generator in the "external" position of switch (4).

(14)

Switchable RF potential divider
To quickly attenuate the RF output voltage by a clearly defined 3 dB or 5 dB.

(15)

RF-output socket
EMF 570 mV max. \geq 380 mV
Into $75 \Omega = \frac{\text{EMF}}{2}$

16

Continuously variable RF output
potential divider, control range
 $0... \geq 95$ dB

17

Pre-set to select wobbulator frequency
from $5...50$ Hz.

18

Simultaneously push-pull on/off switch
for the digital frequency counter.

19

Coarse and fine setting to select RF
generator frequency.

5. Setting Up For Use

5.1 Setting Up The Unit

The unit may be operated in any particular physical location (please refer to Specification, page 3).

Please observe, however, that the ventilation slots must not be covered. Excessive heat convection, from other units for example, must be avoided.

The carrying bracket of the AS 5 may be used to support the equipment in use. The carrying handle may be locked by tilting it towards the instrument base with simultaneous depression towards the hinge points.

5.2 Mains Connection

The AS 5 alignment generator is intended for operation from a 220 V, 50 Hz mains supply.

Connection of the unit which conforms to protection class II as per VDE 0411, DIN 57 411, part 1 is by means of a two-core mains lead without earthing contact.

5.3 Switching On

Depress the upper part of the switch rocker 1 to switch on the unit. Lighting up of the frequency display performs the function of a pilot bulb.

6. Applications/Special Features

6.1 Use of an Unmodulated RF Generator

Set up the unit as follows:

Rotary switch 4 (modulation) to its mid position "0".

Rotary switch 7 to the frequency range required.

Rotary switch 9 (method of operation) to "AM Generator".

Depress the push-pull switch 18.

The output socket 16 now delivers a signal, having a frequency displayed on the frequency display field 8. Simultaneously the correct range of the signal is indicated (kHz, respectively MHz).

The exact required frequency can now be set by means of the coarse and fine control 19.

Set the output voltage, using the RF output potential divider 17 to the value required. For wide band measurements, Q-value determinations, etc., use the switchable potential divider 15. It allows a 3 dB attenuation (LH position) or a 6 dB attenuation (RH position), from the original output level.

NOTE! When measuring low value RF output voltages, for example during sensitivity measurements at high performance receivers, then the steep slopes of the counter pulses may cause interference. In such a case disconnect the counter 18 after you have set the frequency required.

6.2 Use as Modulated RF Generator

The RF potential, generated by the RF generator, may be amplitude modulated in all frequency ranges. For this purpose the carrier amplitude is reduced by 6 dB. Frequency modulation is possible in the ranges in which frequencies of 10.7 and 98 MHz are contained (also 5.5 MHz in the case of option I).

6.2.1 Internal Amplitude Modulation (all frequency ranges)

Carry out all adjustments as under 6.1 but in addition move switch (4) (modulation) in one of its three left-hand switch positions. The following modulation options are available:

Modulation frequency 1 kHz, modulation depth 30%

Modulation frequency 1 kHz, modulation depth 80%

Modulation frequency 4 kHz, modulation depth 60%

6.2.2 External Amplitude Modulation (all frequency ranges)

To modulate the generator frequency by a signal applied from outside, move switch (4) into its extreme right-hand switch position. The low frequency modulation signal (100 Hz...10 kHz) is fed to socket (14). A level of $V_{rms} = 1$ V results in a modulation depth of 30 %.

6.2.3 Internal Frequency Modulation (applies only to frequencies of 10.7 MHz and 98 MHz Additional at AS 5 F 5.5 MHz)

Make the same adjustments as explained under 6.1 but also set the operation selector (9) to its "FM Generator" position. Switch (4) allows selection between the following methods of modulation:

Modulation frequency 1 kHz, deviation ± 15 kHz

Modulation frequency 1 kHz, deviation ± 40 kHz

Modulation frequency 4 kHz, deviation ± 30 kHz

For work on stereo receivers, two further positions are provided whereby the carrier is also modulated by a quartz stabilised 19 kHz pilot tone, in addition to the AM modulation.

Modulation frequency 1 kHz/19 kHz, deviation \pm 15 kHz/ \pm 6 kHz

Modulation frequency 1 kHz/19 kHz, deviation \pm 40 kHz/ \pm 6 kHz

6.2.4 External Frequency Modulation (applies only to frequencies of 10.7 MHz and 98 MHz Additional at AS 5 F 5.5 MHz)

To modulate the generator frequency by means of an external signal, set switch 4 to its extreme right-hand switch position and supply the low frequency modulation signal (30 Hz...20 kHz) to socket (14). A level of 1 V_{rms} produces a deviation of \pm 15 kHz. The maximum deviation is \pm 80 kHz.

6.3 Use as Audio Generator

Socket (14) always supplies an audio signal of 1 kHz, respectively 4 kHz when switch (4) is not set to its "0" or to its "EXTERNAL" position.

The pilot tone frequency of 19 kHz cannot be taken out.

The open circuit output potential is V_{rms} = 3 V (source impedance 10 kΩ).

The output is protected against short circuits.

6.4 Use As Wobbulator-Generator

During wobbulator operation of the AS 5, the RF generator frequency is made to vary between a reference point and an end point by means of a control potential rising under a linear law.

The "wobbulator deviation" (pre-set 10) is now a measure for the magnitude of the frequency variation whereby the wobbulator frequency (control 18) indicates the repetition of the periods per unit of time.

In the case of sawtooth wobulation (switch 12 depressed), the control voltage is brought back to the reference level very soon after reaching the end point. The RF signal is blanked throughout the flyback so that no RF signal is obtained during the back scan of the control signal.

In the case of the control voltage having a triangular shaped law (switch 12 not depressed), the time from the reference point to the end point and back is equally long, there is no signal blanking.

NOTE! When wobbling using a triangular shaped signal, no frequency markers are generated.

The AS 5 frequency ranges which may be wobbled have been selected in such a manner that practically all RF and IF stages of conventional radio receivers may be covered.

Make the following adjustments for wobbulator operation:

Range switch 7 To the required frequency range which may be wobbled. The three ranges where this is possible are identified by a square mark.

Range switch 9 Set the range selector to its left-hand position "AM wobbulator".

Control 10 "Wobbulator deviation". Set this control in accordance with the bandwidth of the object under test so that the curve is shown in its full width.

- Socket (13) This is connected using a coaxial cable (connecting cable L 76) with the X-amplifier input of the oscilloscope or display unit. The input coupling selector should be set to DC coupling.
- Rotary switch (12) This is the "X-amplitude" selector. Adjust its position in such a manner that the full display width is being scanned.
- Attenuator (15) and RF Divider (17) Set to the required output potential. Do not overdrive object under test.
- RF Socket (16) This is connected with the object under test. The following accessories may have to be used (please refer to section 3. Accessories):
Wideband Balun SU 753 A, Artificial Aerial AM 10/AE 10, Grip Terminal ZK 75, Connecting Cable L 76.
- NOTE: Keep DC potentials from the RF output!
- Control (18) Set the required deflection speed, depending on the object under test. The correct setting is found by wobbling, using a non-blanked triangular voltage shape. For this purpose pull the push-pull switch (12). If the deflection speed is too great, then twin displays of the pass band result.
- Control (19) This is used to select the centre generator frequency. With pre-set (10) set to maximum, maximum deviation results and the full frequency band is wobbled. In such a case control (19) has no effect.
- NOTE: The display (8) shows the marker frequency, not the generator centre frequency when using the sawtooth deflection voltage (please refer to 6.4.2.).

6.4.1 Wobbulation of Controlled Amplifiers

Various amplifiers have special control circuits (delayed control, keyed control) which have an effect on the amplifier gain control. When wobbulating such equipment always ensure that no gain variations occur during the process of wobbulation. For this purpose the amplifier control must be made inoperative. The control circuit is then opened for this purpose and a fixed control potential is supplied to the component responsible for gain control (refer to the set manufacturer). For this purpose socket ③ supplies a DC potential, free from any chassis connection, the level of which may be set by control ②.

The DC potential is also used to shift the threshold of a demodulated RF signal during wobbulator operation.

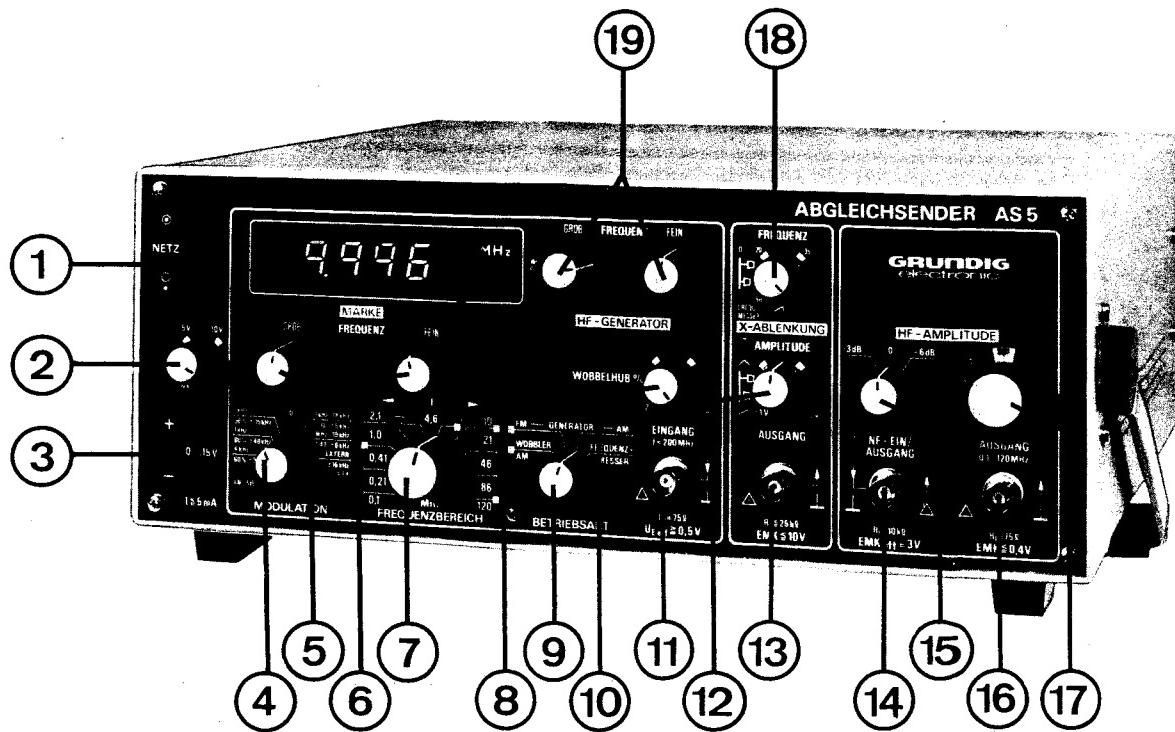
6.4.2 Measurement of Marker Frequency

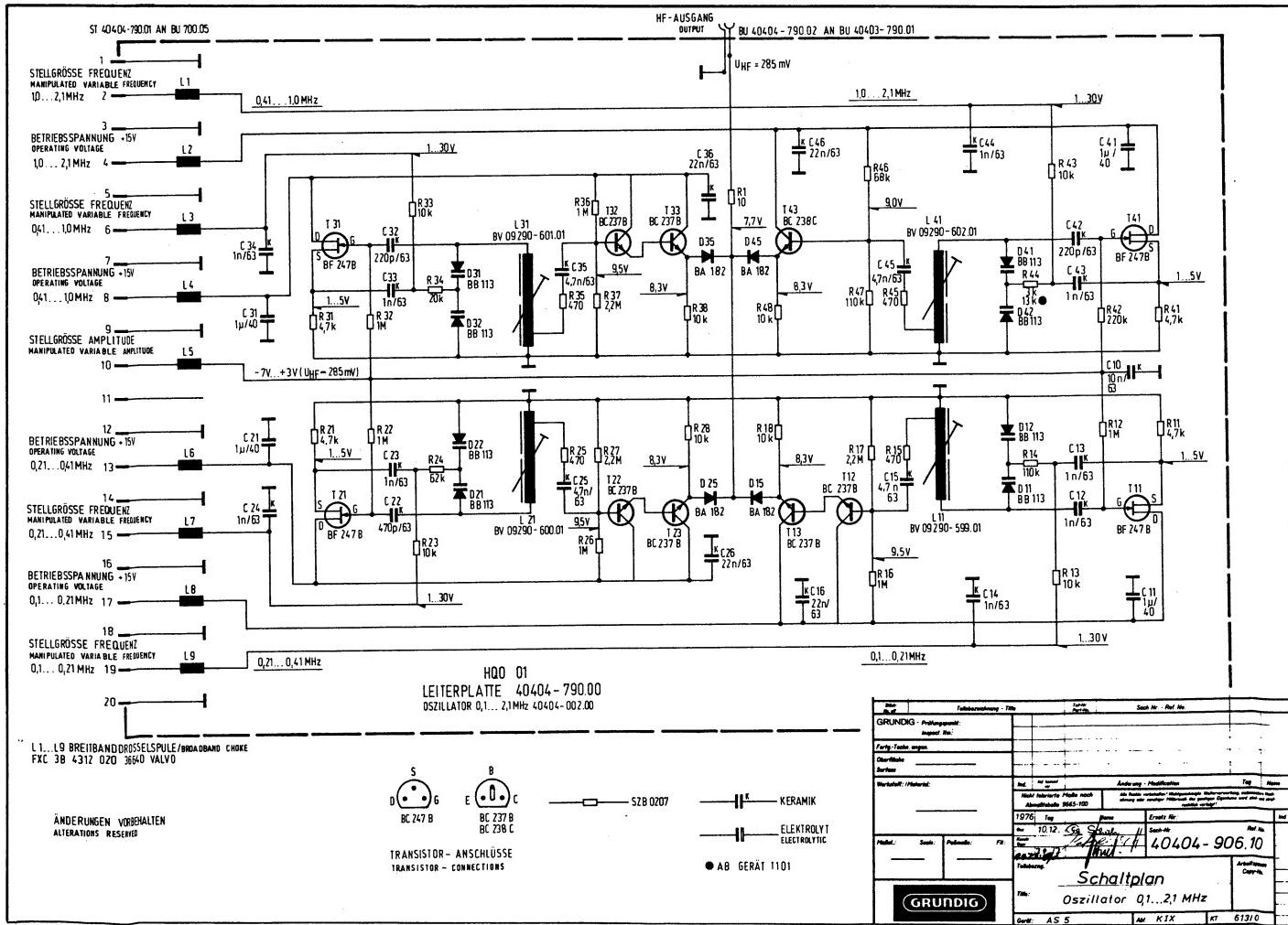
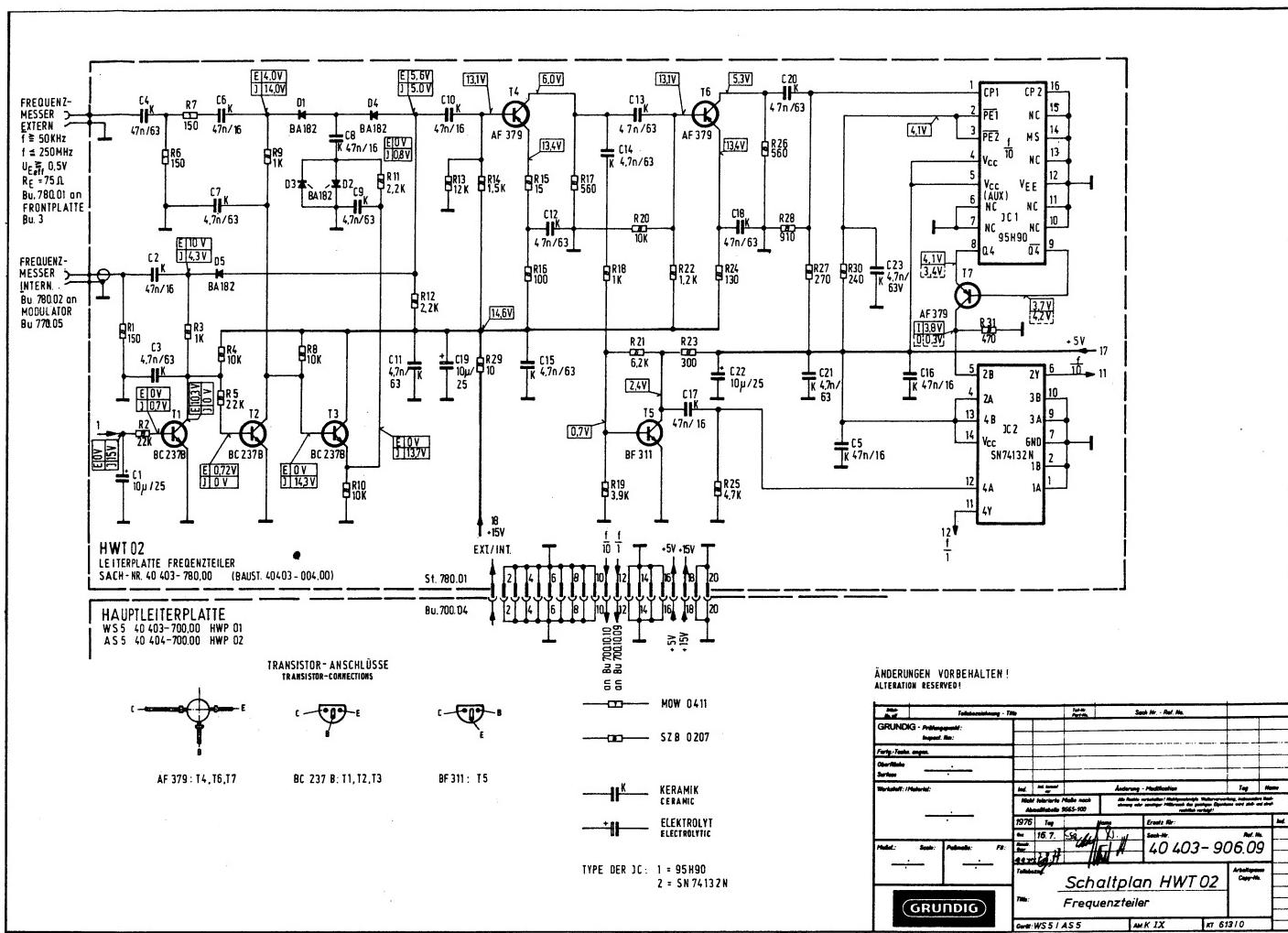
The AS 5 alignment generator replaces the conventional marker frequency generator by a digital frequency meter.

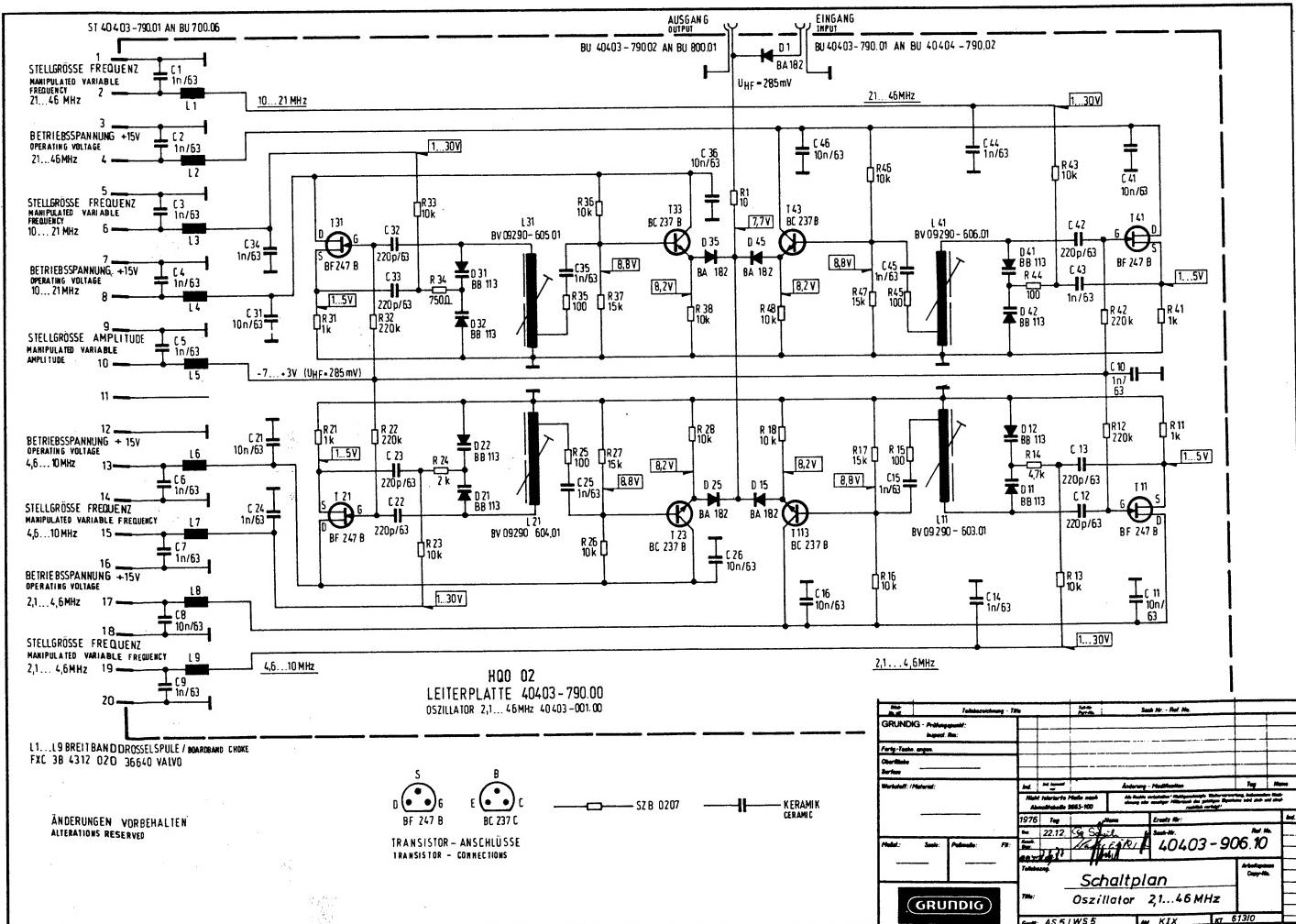
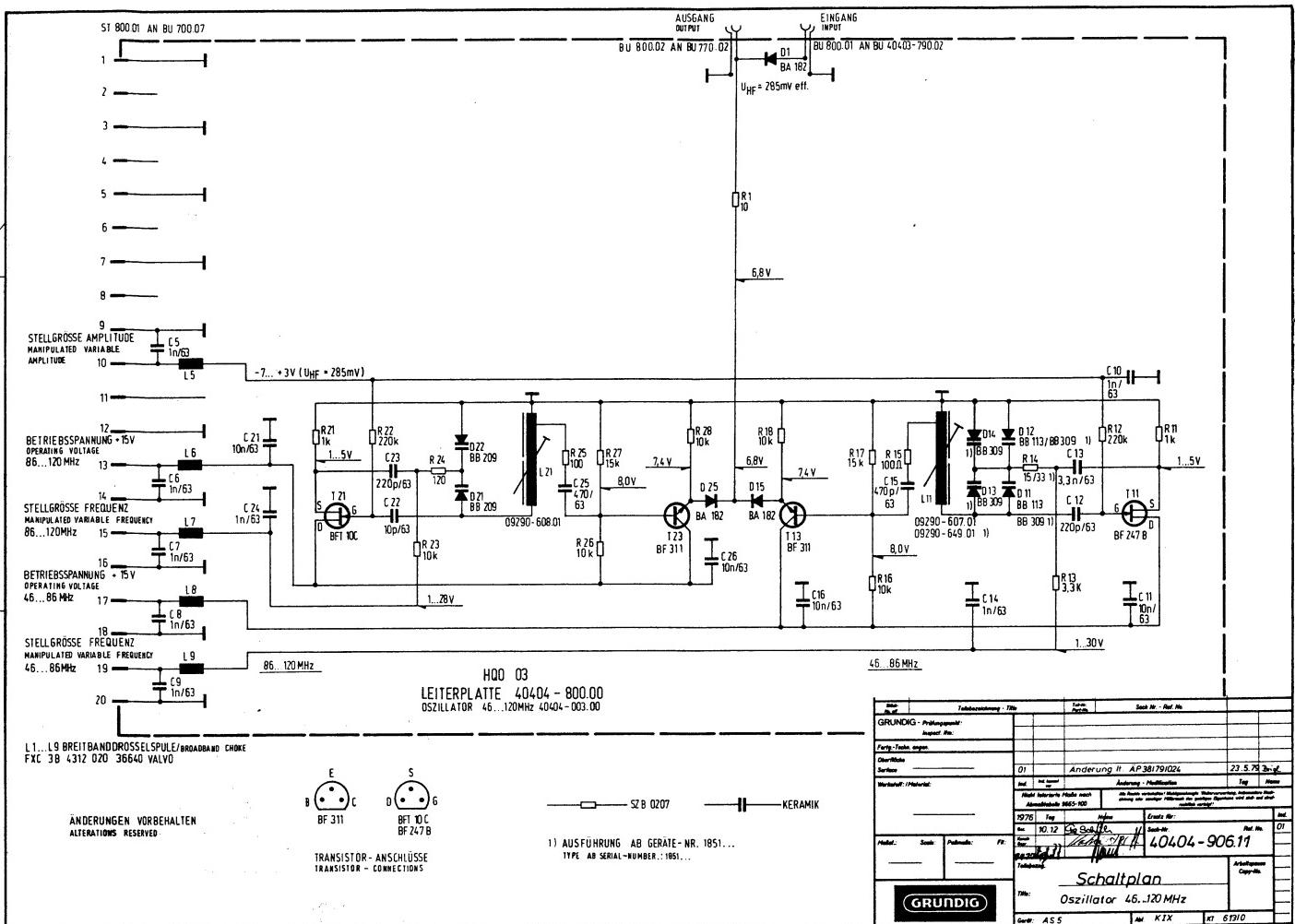
To measure the frequency at any particular point of a wobbulator curve, a light marker pip is generated at this point by stopping the frequency control voltage and by measuring the frequency of the wobbulator RF generator reached at that precise moment in time.

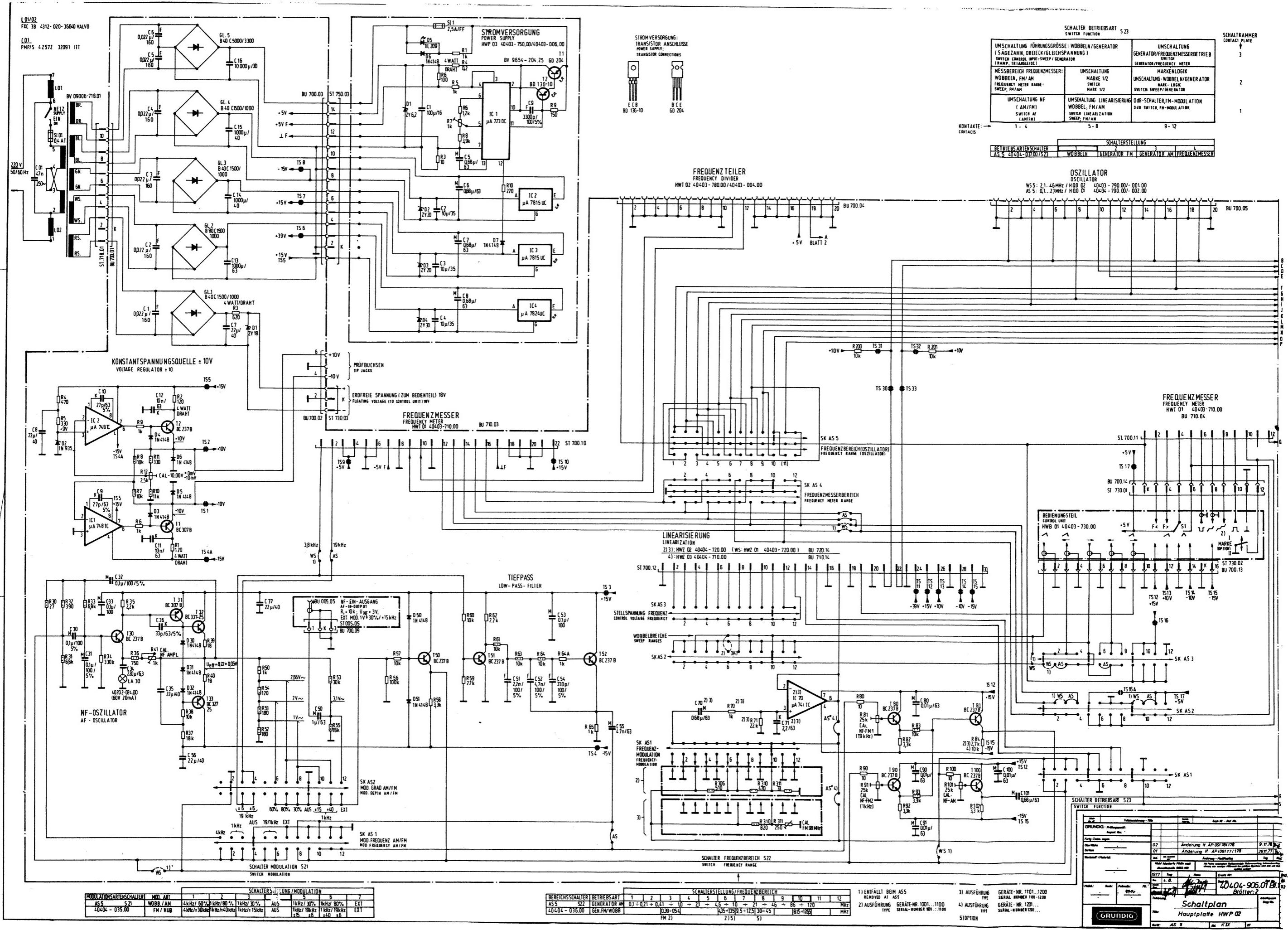
The marker pip may be selected within any particular wobbulator range, using control ⑤. Display of the marker frequency is on display field ⑧, using a floating comma and with range indication. The push-pull switch ⑯ is depressed for this purpose!

NOTE: The marker pip itself as well as the corresponding frequency display only appear if pre-set ⑤ is set to a frequency which is within the frequency range covered by the wobbulator deviation. In all other cases no marker pip will appear on the wobbulator curve and the display ⑧ of the AS 5 display a value of "0".

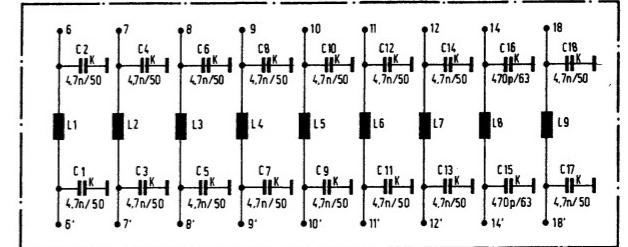








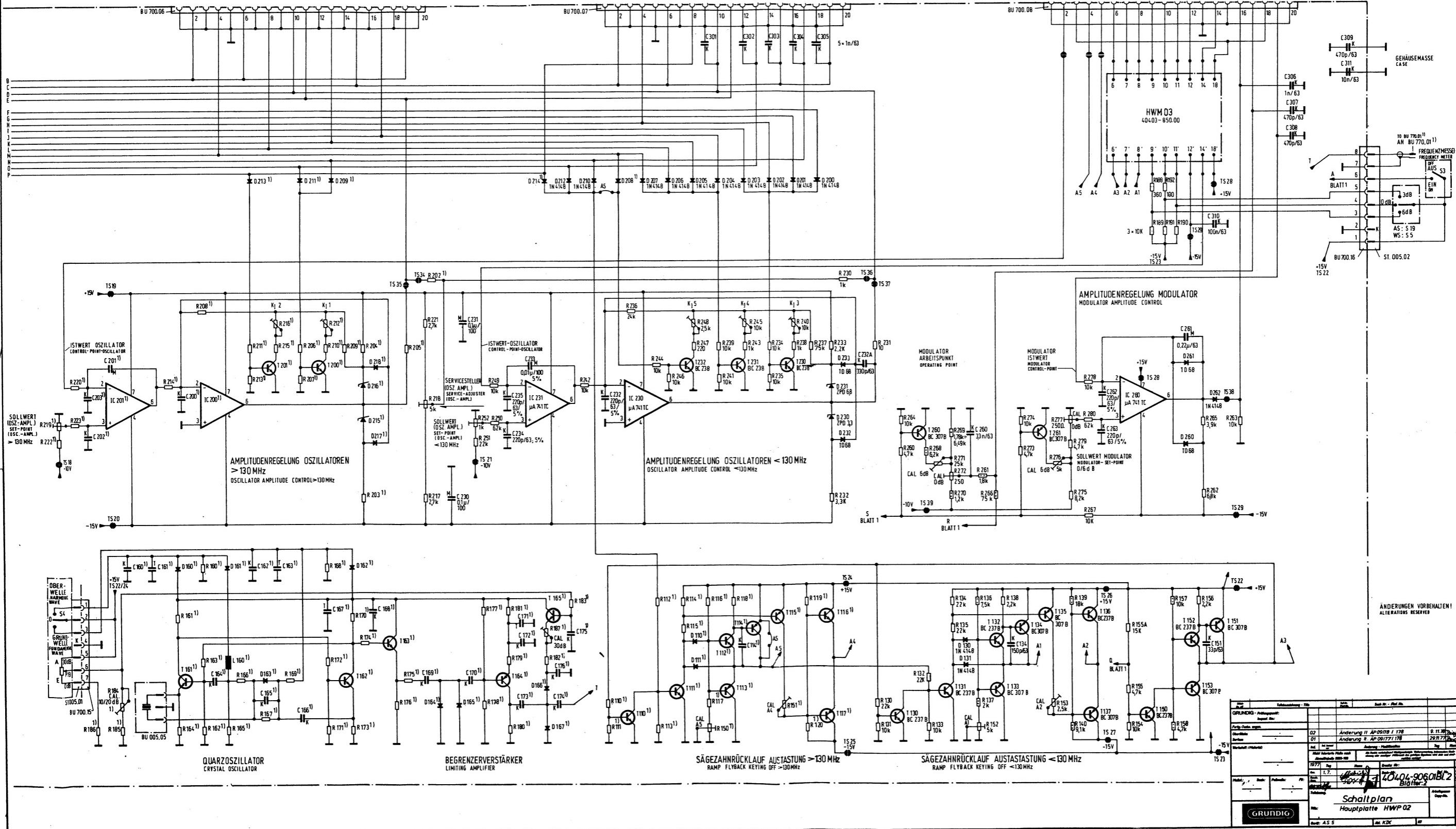
LEITERPLATTE SIEBUNG HWM 03 40403-850.00
PRINTED CIRCUIT BOARD FILTER HWM 03 40403-850.00

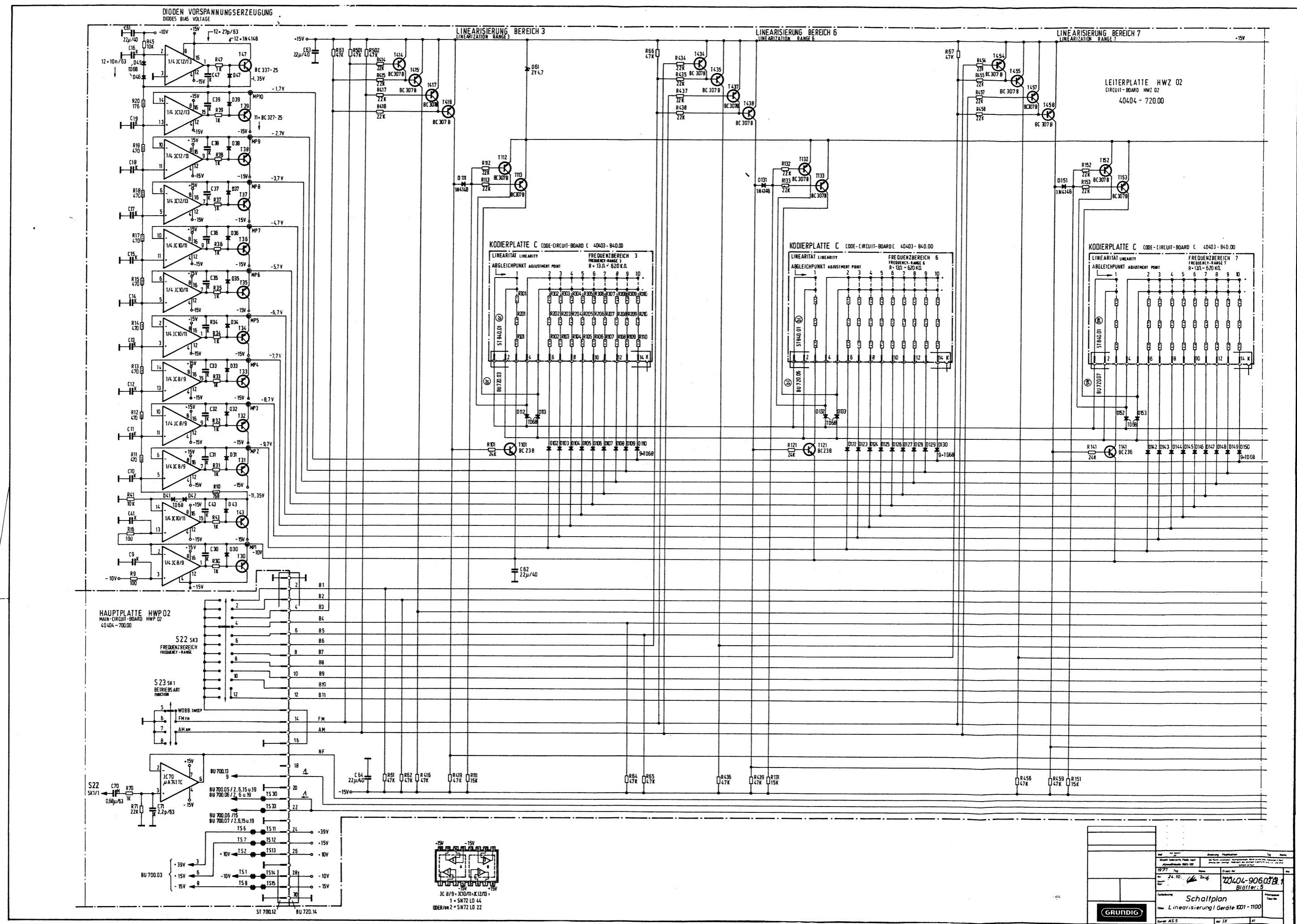


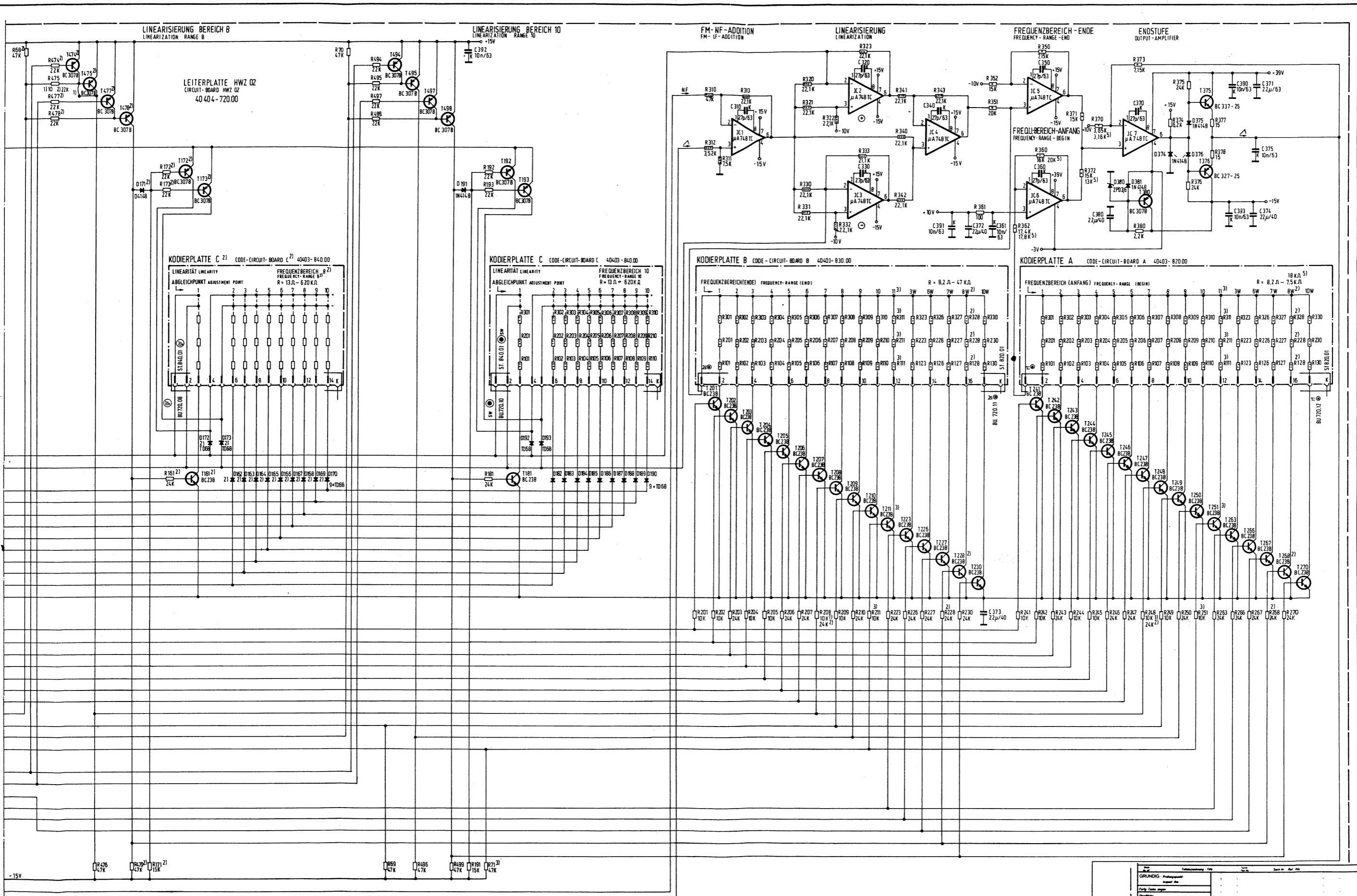
OSZILLATOR oscillator
WS5 : 0.39 - 0.54 / 45 - 240 MHz / H00 04 40403-800.00/-002.00
AS5 : 2.1 - 46 MHz / H00 02 40403-790.00/-001.00

OSZILLATOR oscillator
WS5 : 240 - 860 MHz / H00 05 40403-810.00/-003.00
AS5 : 46 - 120 MHz / H00 03 40404-800.00/-003.00

MODULATOR modulator
WS5 : HWM 01 40403-770.00/40403-005.00
AS5 : HWM 02 40404-770.00/40404-004.00







1) ENTFALLT WENN BEREICH 8 LINEARISIERT
 2) ENTFALLT WENN BEREICH 8 NICHT LINEARISIERT
 3) ENTFALLT WENN BEREICH 11 NICHT BESTÜCKT
 5) AB GERÄT - NR. 1551

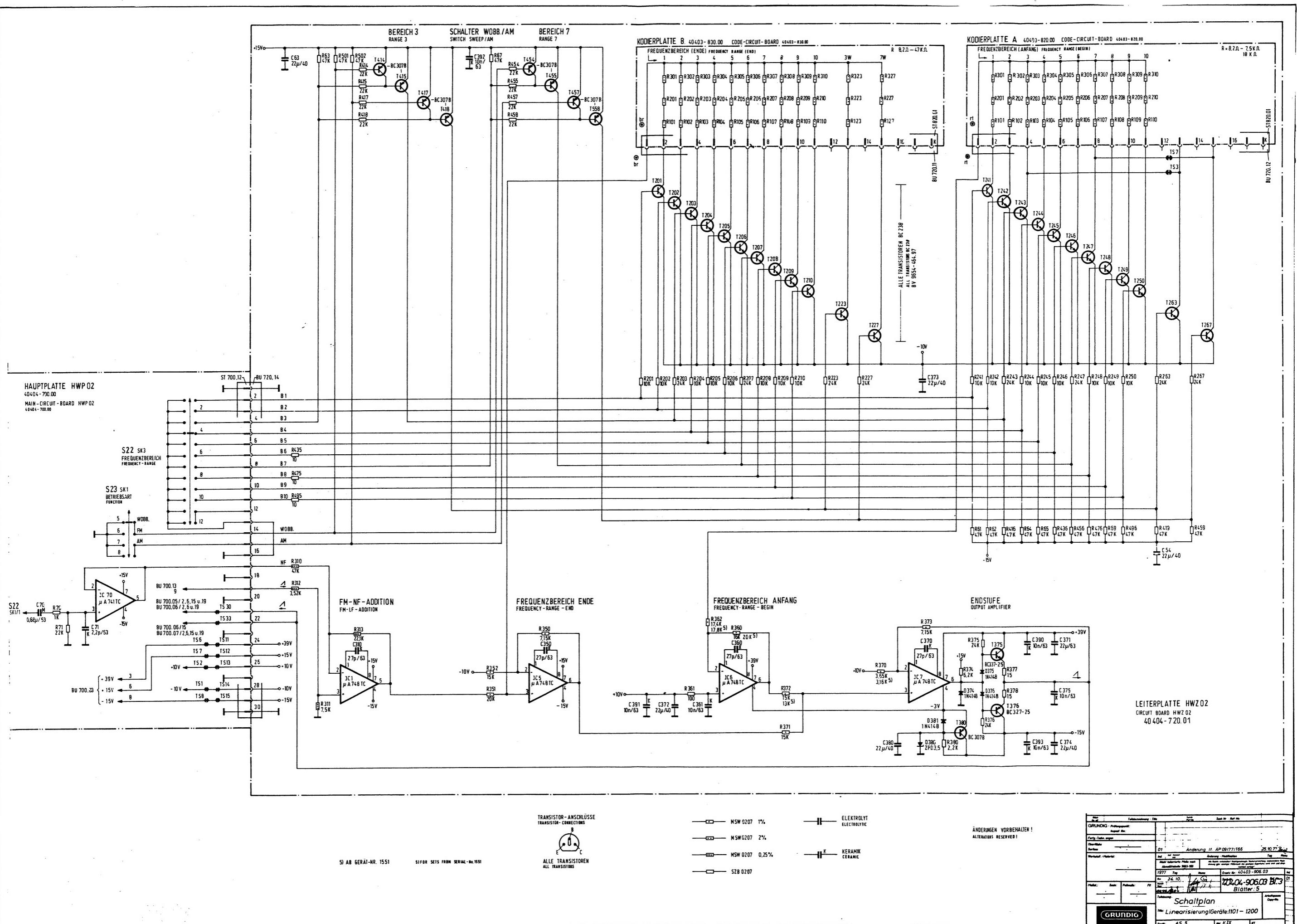
1) OMITTED IF RANGE 8 LINEARIZED
 2) OMITTED IF RANGE 8 NOT LINEARIZED
 3) OMITTED IF RANGE 11 NOT EQUIPPED
 5) FOR SETS FROM SERIAL - NO. 1551

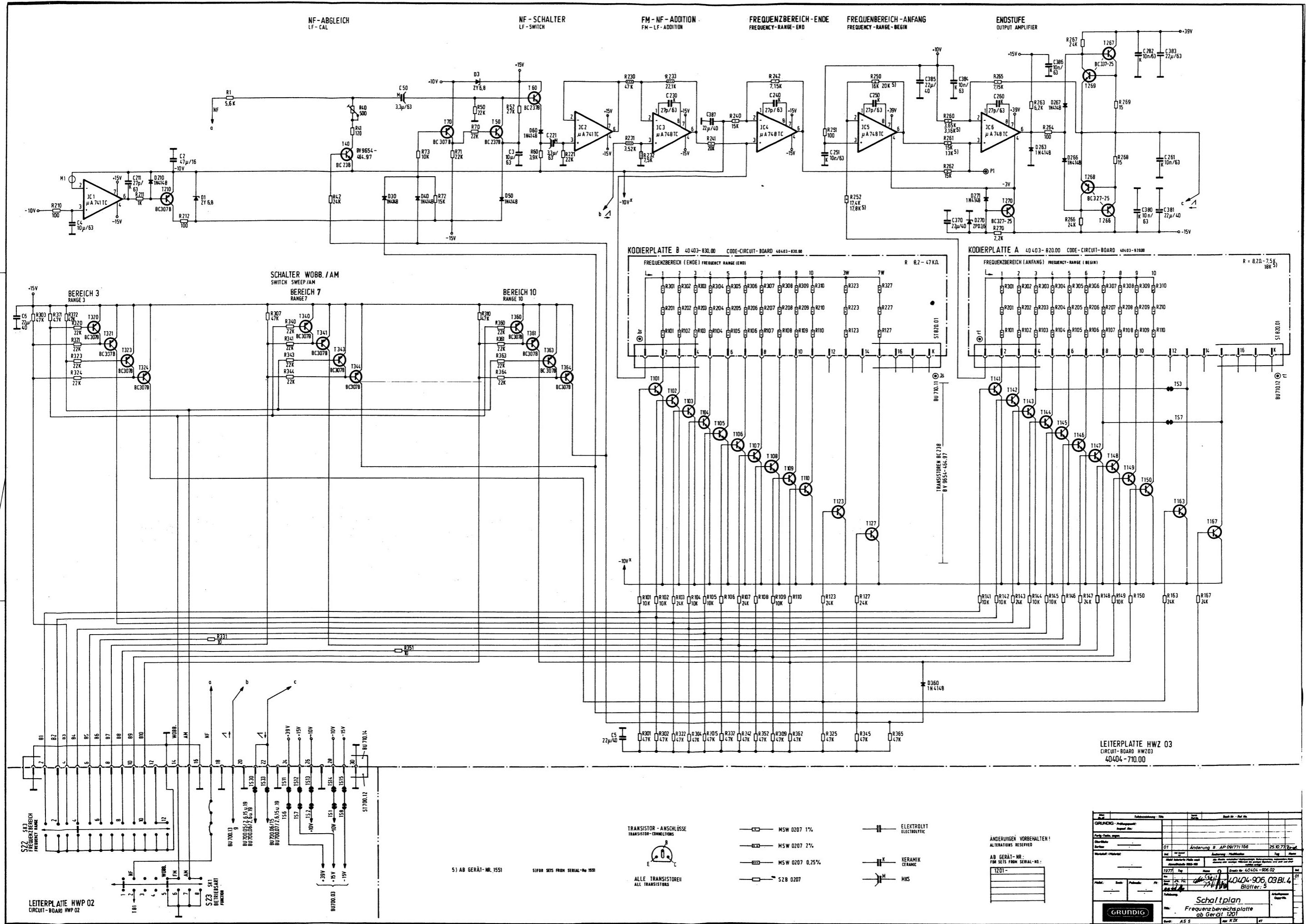
TRANSISTOR-ANSCHLÜSSE
 BC 307 B BC 328 nach BV 9654-464.97
 BC 327-25 E C

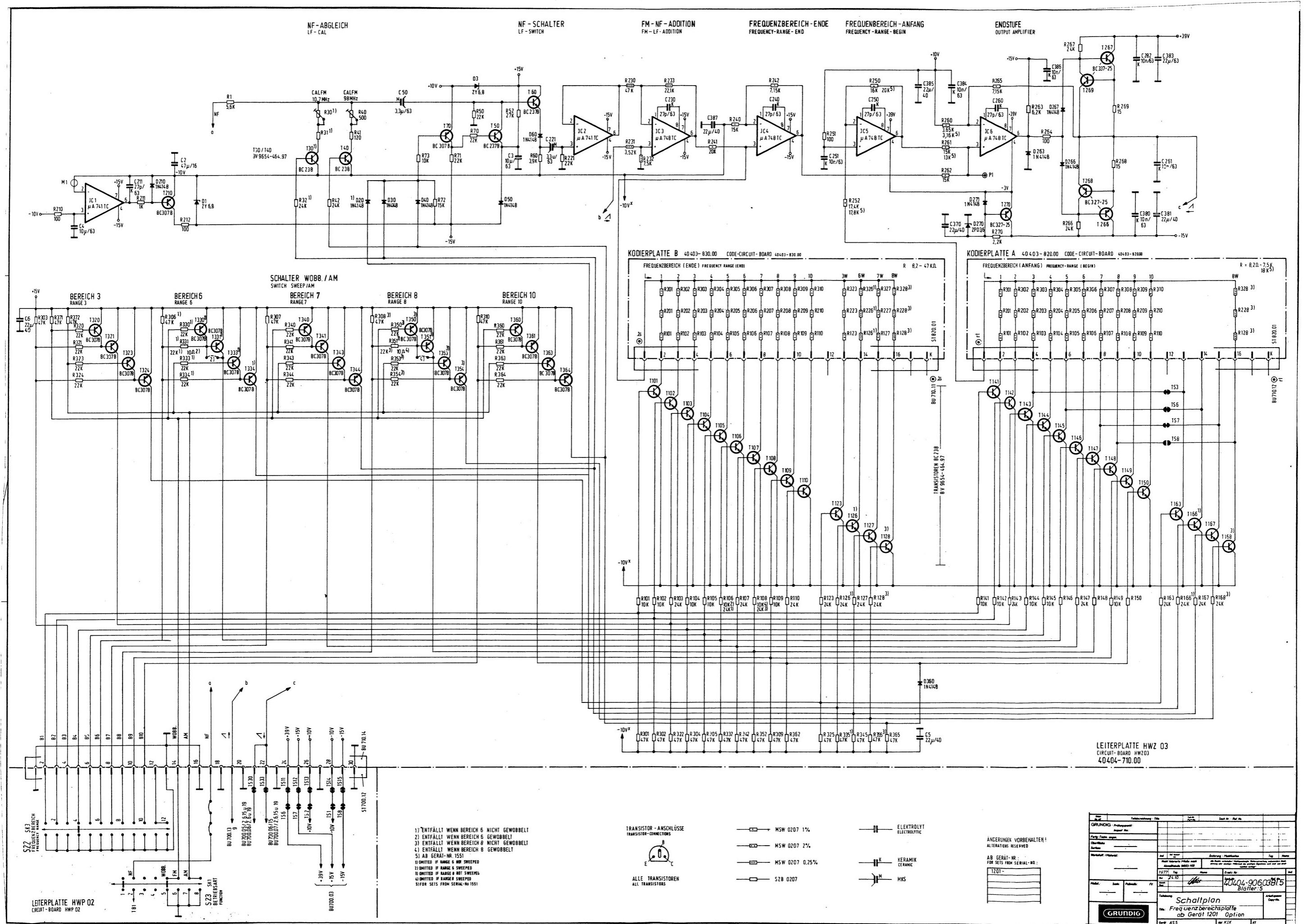
MSW 0207 2% MSW 0207 0.25% ELEKTROLYT
 MSW 0207-1% S2B 0207 KERAMIK
 TD 68 nach BV 9654-465.97 ÄNDERUNGEN VORBEHALTEN!
 ALTERATIONS RESERVED!

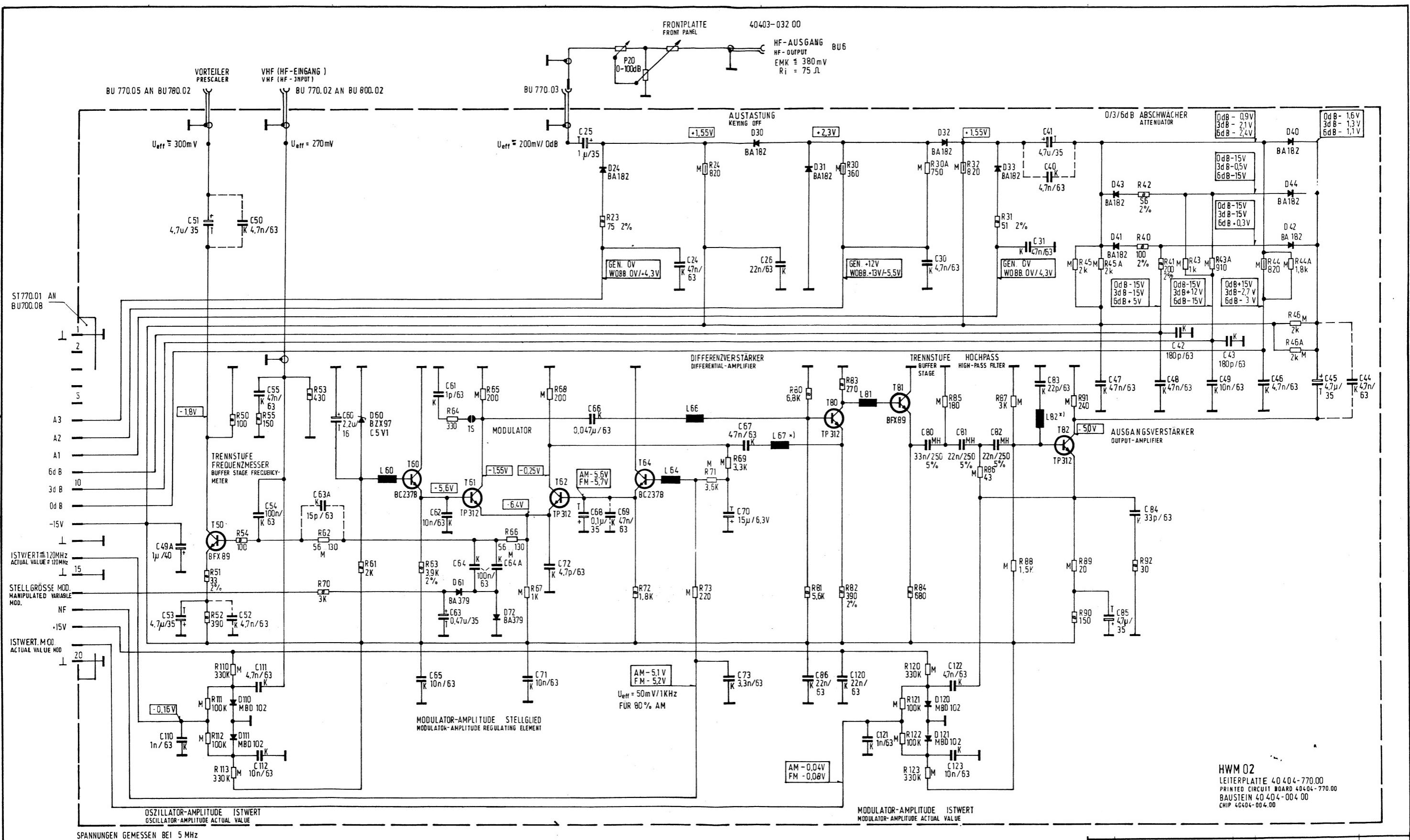
Zeichnung		Zeilenzähler		Blattzähler		Seite		Reihen	
GRUNDIG - Produktions	Zeichnungsnummer	1	1	1	1	1	1	1	1
Party-Fachl. Angabe	Import-Art								
Übernahme									
Marktauf! Material									
Ind. Art	Art	Art	Art	Art	Art	Art	Art	Art	Art
Hoch Intensiv-Methode nach	Art								
Allgemeine 1962/100									
1977	Art								
Fachkunst	Art								
Erstellen	Art								
Zeichnungsnummer	Zeichnungsnummer	Zeichnungsnummer	Zeichnungsnummer	Zeichnungsnummer	Zeichnungsnummer	Zeichnungsnummer	Zeichnungsnummer	Zeichnungsnummer	Zeichnungsnummer
Zeilenzähler	Zeilenzähler	Zeilenzähler	Zeilenzähler	Zeilenzähler	Zeilenzähler	Zeilenzähler	Zeilenzähler	Zeilenzähler	Zeilenzähler
Blattzähler	Blattzähler	Blattzähler	Blattzähler	Blattzähler	Blattzähler	Blattzähler	Blattzähler	Blattzähler	Blattzähler
Seite	Seite	Seite	Seite	Seite	Seite	Seite	Seite	Seite	Seite
Reihen	Reihen	Reihen	Reihen	Reihen	Reihen	Reihen	Reihen	Reihen	Reihen
Zeilenzähler	Zeilenzähler	Zeilenzähler	Zeilenzähler	Zeilenzähler	Zeilenzähler	Zeilenzähler	Zeilenzähler	Zeilenzähler	Zeilenzähler
Blattzähler	Blattzähler	Blattzähler	Blattzähler	Blattzähler	Blattzähler	Blattzähler	Blattzähler	Blattzähler	Blattzähler
Seite	Seite	Seite	Seite	Seite	Seite	Seite	Seite	Seite	Seite
Reihen	Reihen	Reihen	Reihen	Reihen	Reihen	Reihen	Reihen	Reihen	Reihen

Z04 04-906.037.2
 Blätter: 5
 Schaltplan
 Linearisierung/Geräte 1001-1100
 Copy-It









SPANNUNGEN GEMESSEN BEI 5 MHz
VOLTAGE MEASURED AT 5 MHz

TP 312 : T61,T62,
T80,T82.

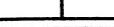
TRANSISTOR - ANSCHLÜSS TRANSISTOR-CONNECTIONS

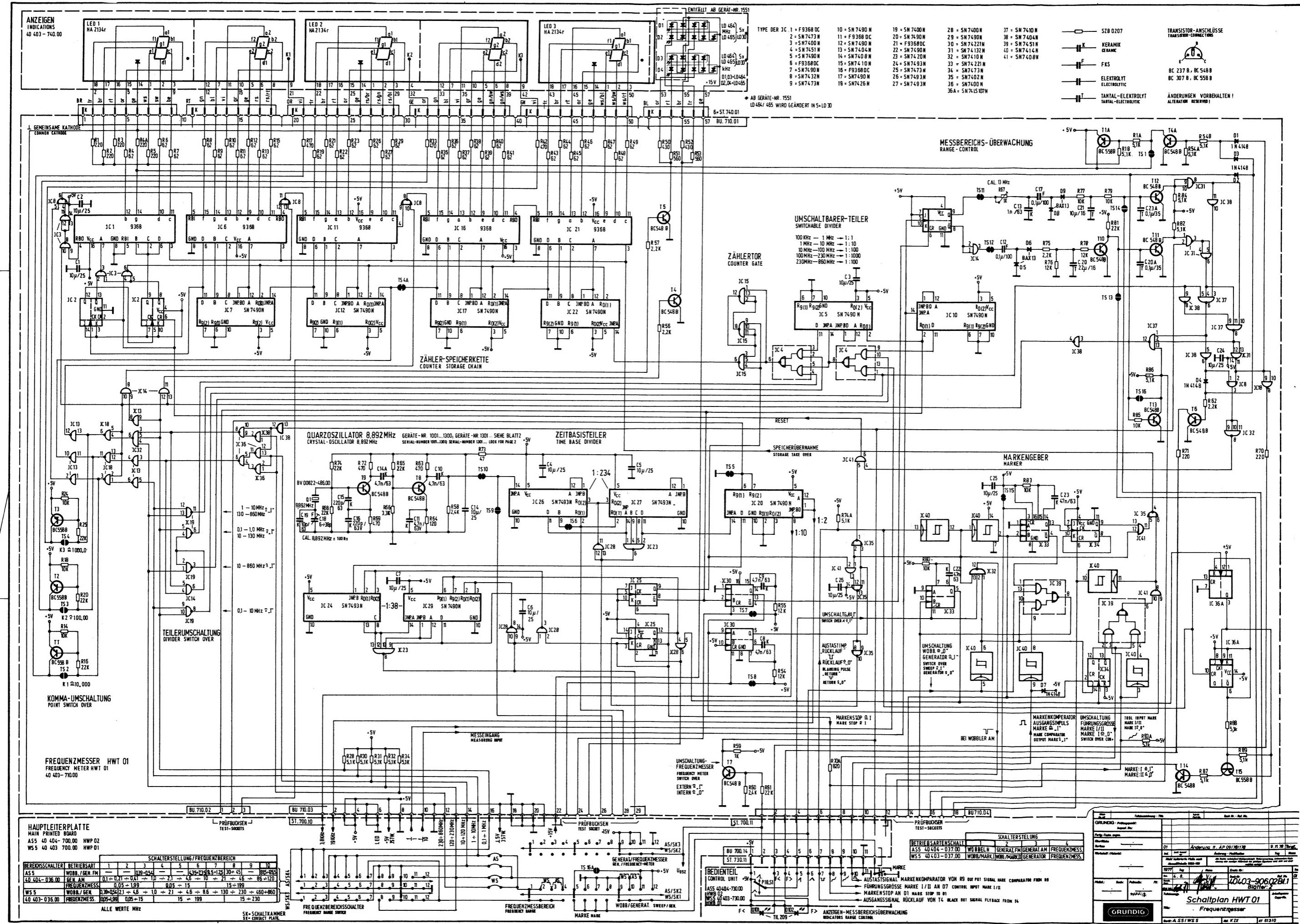
BC 237B:160

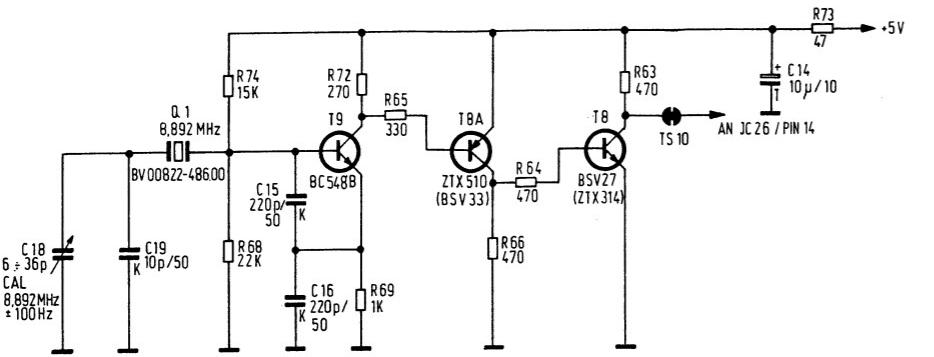
DÄMPFUNGSPERLE
VALVO 4 312 020-31 00
*) SIEMENS B 62110-
A 3048-X

**ÄNDERUNGEN VORBEHALTEN!
ALTERATIONS RESERVED!**

	MKH		SZB 0207
	KERAMIK CERAMIC		SZB 0207; 2%
	ELEKTROLYT ELECTROLYTIC		MSW 0309 2%
	TANTAL-ELEKTROLYT TANTAL-ELECTROLYTIC		MSW 0207, 2%

Stam Merk	Teilebezeichnung - Title	Part No. Part-Nr.	Sach Nr. - Ref. No.	
GRUNDIG - Prüfungspunkt: Inspect. Pnt:				
Fertig - Techn. angen				
Oberfläche Surface				
Werkstoff / Material:				
Modell:	Scale:	Patrone:	Fit:	
Änderung - Modification <small>Ind. Ind kennet die Änderung</small>				
<small>Nicht tolerierte Maße nach Abmatrikelleiste 9655-100</small>				
<small>Alle Rechte vorbehalten! Nachdruck, Vervielfältigung, auszugsweise Ver- wendung oder sonstiger Weiterverbreitung des gezeigten Exemplars wird streng und dras- tischst verboten!</small>				
1977	Tag	Norme	Ersetzt für:	Ind.
Gen.	4.8.	<i>EN 60065</i>	<i>Seite 1 von 2</i>	
Gepr.				
Kontrolleur				
Teilebezeichnung:				Arbeitspapiere Copy-No.
Schaltplan HWM 02 Modulator				
Title:		AM-XIX	KT 61310	
Grau A.S. 5				
				

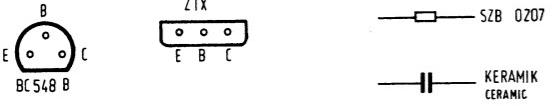




QUARZOSZILLATOR FÜR FREQUENZMESSER AB GERÄTE-NR. 1301...
CRYSTAL-OSCILLATOR FOR FREQUENCY METER FROM SERIAL-NUMBER 1301....

ÄNDERUNG VORBEHALTEN
ALTERATIONS RESERVED

TRANSISTORANSCHLÜSSE
TRANSISTOR CONNECTIONS



Teile-Nr.	Teilebezeichnung - Titel	Teile- Nr.	Sach-Nr. - Ref. Nr.
GRUNDIG - Prüfungszeit: Inspec. Rn:			
Fertig-Tech. angeg. Oberfläche Serie:			
Markstoff-/Material:	01	Aenderung It. AP 09/78/178	13.11.78
Nicht indizierter Modus nach Abmessungen 96x5-100 die Ringe verbleiben (Während der Montage müssen die Ringe entfernt werden und darf nicht beschädigt werden)			
1977	Tag	Name	Ersatz-Nr.
des:	4.8.	<i>40403-9060281.2</i>	01
Modell:	Skala:	Perioden:	Fl:
Schaltplan HWT 01 Tit: Quarzoszillator			
Gerb: AS51WS5 Am. IX KT			

GRUNDIG

